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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/828,437	04/21/2004	Shosuke Endoh	252112US2	5495
22850	7590	06/15/2006	EXAMINER	
OBLON, SPIVAK, MCCLELLAND, MAIER & NEUSTADT, P.C. 1940 DUKE STREET ALEXANDRIA, VA 22314			DHINGRA, RAKESH KUMAR	
			ART UNIT	PAPER NUMBER

1763

DATE MAILED: 06/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/828,437

Applicant(s)

ENDOH ET AL.

Examiner

Rakesh K. Dhingra

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 03 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 21 April 2006.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 4-7, 11 and 22-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-3, 8-10 and 12-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 21 April 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 04/04, 01/06
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_\_

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### ***Election/Restrictions***

Applicant's election without traverse of species 5 (claims 1-3 –generic, 8-10, 12-21) in the reply filed on 4/21/06 is acknowledged. Accordingly claims 4-7, 11, 22-27 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a non-elected species.

### ***Drawings***

Figures 17-19 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The use of the trademark Galden (for example at page 10, line 33) has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

### ***Claim Rejections - 35 USC § 112***

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 10 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 10 contains the trademark/trade name "Galden". Where a trademark or trade name is used in a claim as a limitation to identify or describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe a heat transfer medium and, accordingly, the identification/description is indefinite. For the purpose of examination on merits this limitation has been interpreted to mean heat transfer medium like Helium gas.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

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**Claim 8 is rejected under 35 U.S.C. 102(b) as being anticipated by Nagaiwa et al (US PG PUB No. 2002/0029745).**

Regarding Claim 8: Nagaiwa et al teach a plasma processing apparatus (Figures 2, 3) comprising:

a worktable (susceptor) 6 having an electrostatic chuck on which is mounted a wafer W to be processed that is to be subjected to plasma processing, and a focus ring 12 having a contact surface (surface 11B of worktable) disposed in contact with said electrostatic chuck around a periphery of the object W to be processed; and a heat transfer medium (heat exchange means) 15 provided at said contact surface for carrying out heat exchange with the focus ring (paragraphs 0044, 0045).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

**Claims 1, 2 are rejected under 35 U.S.C. 103(a) as being unpatentable over by Maeda et al (US PG PUB No. 2001/0022293).**

Regarding Claims 1, 2: Maeda et al teach a plasma processing apparatus (Figure comprising:

a wafer loading stage (susceptor) 2 having an electrostatic chuck on which is mounted a wafer (object) 3 to be processed that is to be subjected to plasma processing, and a focus ring 4 having a contact portion disposed in contact with said electrostatic chuck; wherein said focus ring has a ring shaped dielectric plate (dielectric part) 102 that forms said contact portion, and a conductive material portion 4 that faces said electrostatic chuck with said dielectric material portion there between. Maeda et al also teach that focus ring 4 can be made of conductive material like silicon and the thickness and material of the dielectric plate 102 can be changed (optimized) so that high frequency bias power applied to focus ring can be controlled (paragraphs 0069, 0091, 0093, 0094).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to select material of dielectric portion and optimize its thickness as taught by Maeda et al in so that high frequency bias power applied to focus ring can be controlled.

**Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Maeda et al (US PG PUB No. 2001/0022293) in view of Fink et al (US PG PUB No. 2004/0028837).**

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Regarding Claim 3: Maeda et al teach all limitations of the claim including focus ring comprising a conductive part (made from silicon) and a dielectric part.

Maeda et al do not teach material of dielectric part.

Fink teach an apparatus (Figure 8) that includes a plasma chamber having a chuck electrode assembly 154 and a focus ring structure 168 where focus ring is made from silicon dioxide (dielectric) (paragraph 0057).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use silicon dioxide as material of dielectric part of focus ring as taught by Fink in the apparatus of Maeda et al to enable uniform distribution of plasma.

**Claims 9, 10, 12, 16, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaiwa et al (US PG PUB No. 2002/0029745) in view of Koshiishi et al (US PG PUB No. 2003/0106647).**

Regarding Claims 9, 10, 12, 16: Nagaiwa et al teach all limitations of the claim including cooling of focus ring but do not teach heat exchange means comprise groove in contact surface and filled with a heat transfer medium.

Koshiishi et al teach an apparatus (Figure 1) includes a holder main body (susceptor) 11 with a focus ring 12 and a heat exchange means for cooling the wafer W and the focus ring 12 that comprises a heat transfer medium (Helium gas) flowing through gas supply path (groove) 17 in the holder main body (chuck) 11 (paragraphs 0038, 0043).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to provide heat exchange means having a groove filled with heat transfer medium as taught by Koshiishi et al in the apparatus of Nagaiwa et al to achieve

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efficient cooling of focus ring and process the entire surface of wafer with uniformity (paragraph 0054).

Regarding Claim 18: Koshiishi et al teach a dielectric film 14a, 14b (like an electrode) built into said electrostatic chuck 11 in a manner facing said focus ring 12 and where a DC power supply 15 applies a predetermined voltage (like a voltage controller) that controls a voltage applied to electrode 14a, 14b wherein said electrode attracts focus ring 12 to electrostatic chuck 11 by electrostatic attraction, the plasma processing comprises a plurality of steps, and said power supply (controller) 15 changes the voltage applied to said electrode as per process steps (paragraph 0041).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use controller as taught by Koshiishi et al in the apparatus of Nagaiwa et al to enable control attraction of focus ring with the lower electrode.

**Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaiwa et al (US PG PUB No. 2002/0029745) in view of Koshiishi et al (US PG PUB No. 2003/0106647) as applied to Claim 9 and further in view of Kanno et al (US PGUB No. 2003/0164226).**

Regarding Claim 13: Nagaiwa et al in view of Koshiishi et al teach all limitations of the claim including groove for heat transfer medium but do not teach depth of groove.

Kanno et al teach an apparatus (Figure 3) that includes a wafer stage 52 with gas grooves 60. Kanno et al further teach depth of gas groove as 0.5 mm (greater than 0.1 mm as per claim limitation) and that depth is optimized based upon proper flow of heat transfer medium around the outer periphery of wafer (paragraph 0071).



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Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to optimize depth of groove as taught by Kanno et al in the apparatus of Nagaiwa et al in view of Koshiishi et al to achieve proper flow of heat transfer medium for efficient cooling of focus ring.

Regarding Claims 14,15: Kanno et al teach that groove has rounded corner and also comprise annular shape concentric with focus ring (Figure 5).

**Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaiwa et al (US PG PUB No. 2002/0029745) in view of Koshiishi et al (US PG PUB No. 2003/0106647) as applied to claim 16 and further in view of Shoda et al (US PG PUB No. 2001/0008172).**

Regarding Claim 17: Nagaiwa et al in view of Koshiishi et al teach all limitations of the claim except controller that controls a pressure of heat transfer gas during processing of wafer.

Shoda et al teach an apparatus (Figure 2) that includes a susceptor 14 and where helium as heat transfer gas is circulated in space 32 between wafer and susceptor 14.

Shoda et al also teach that during wafer processing, pressure of helium gas is controlled by a pressure controller 36 (paragraph 0003).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to control pressure of heat transfer gas (helium) as taught by Shoda et al in the apparatus of Nagaiwa et al in view of Koshiishi et al to enable control thermal conductivity of helium as per process conditions (processing steps) [paragraph 0003].

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**Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nagaiwa et al (US PG PUB No. 2002/0029745) in view of Koshiishi et al (US PG PUB No. 2003/0106647) as applied to Claim 16 and further in view of Huang (US PG PUB no. 2004/0005726).**

Regarding Claims 19, 20: Nagaiwa et al in view of Koshiishi et al teach all limitations of the claim except that heat exchange medium reduces temperature of focus ring to at least below 20K below the temperature of electrostatic chuck.

Huang teach an apparatus (Figures 3, 5A, 5B) that includes an electrostatic chuck 16 with a temperature controlled focus ring 52 having heat transfer means 54. Huang further teach that heat transfer means controls the temperature of focus ring to within a range of 100 degrees C +/- 30 degrees C [paragraph 0025, 0041-0043]. Since this range is less than the claim range of (temperature lower by 253 degrees C than that of chuck), the prior art reference anticipates the claim range.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to use temperature control means as taught by Huang in the apparatus of Nagaiwa et al in view of Koshiishi et al to enable control temperature of focus ring especially for use in plasma etch chambers where fluorine containing plasma processing takes place (paragraph 0038).

Regarding Claim 21: Huang teach that apparatus comprises heat transfer means that can heat the focus ring (paragraph 0041).

### ***Conclusion***

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rakesh K. Dhingra whose telephone number is (571)-272-5959. The examiner can normally be reached on 8:30 -6:00 (Monday - Friday). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571)-272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Rakesh Dhingra



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Art Unit 1763